Space Science Division

1998 Annual Report

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COVER ART: Artist's concept of the brilliance and beauty of a sun at the center of some solar system; a welcoming beacon in the darkness of space.
(Artwork: James Schilling)

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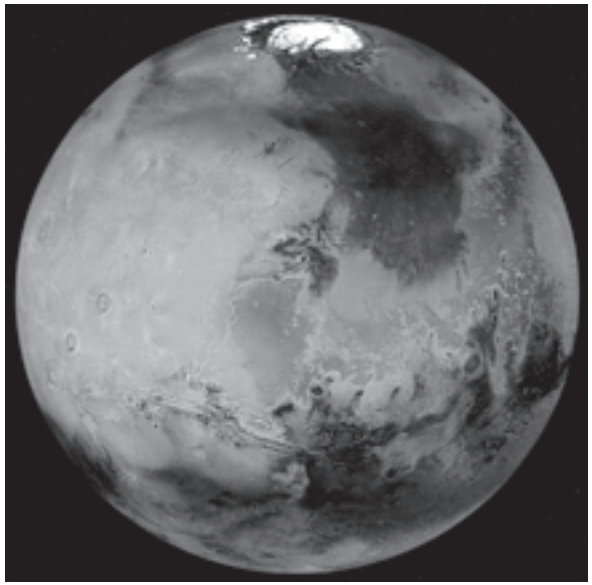

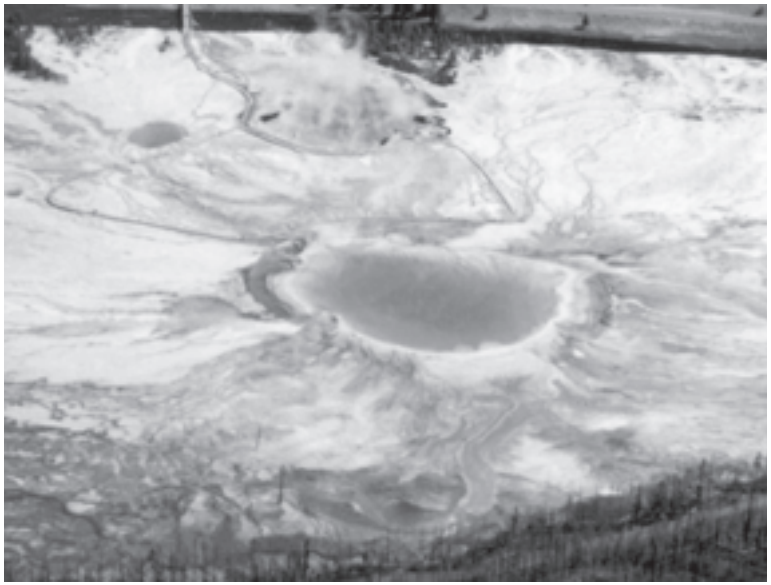

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DIVISION OVERVIEW

The Space Science Division at NASA's Ames Research Center conducts research programs that are structured around the study of the origins and evolution of stars, planetary systems, and life, and that address some of the most fundamental questions pursued by science, questions that examine the origin of life and of our place in the universe, and questions that lie at the heart of the emerging discipline of Astrobiology.

Ames is recognized as a world leader in Astrobiology, defined as the study of life in the universe and the chemical and physical forces and adaptations that influence life's origin, evolution, and destiny. In pursuing this primary Center mission in Astrobiology, scientists in the Space Science Division perform pioneering basic research and technology development to further fundamental knowledge about the origin, evolution, and distribution of life within the context of cosmic processes. To accomplish this objective the Division has assembled a multidisciplinary team of scientists including astronomers, astrophysicists, chemists, microbiologists, physicists, and planetary scientists. It also requires access to the space environment, since many of the critical data needed to elucidate the evolutionary steps outlined above are only available in space in star-forming regions, in the interstellar medium, and in and around planetary environments.

Major elements of the Space Science Division's program include the study of the interstellar gas and dust that form the raw material for stars, planets, and life; the processes of star and planet formation; the evolution of planets and their atmospheres; the origin of life and its early evolution on the Earth; the search for past or present life throughout the solar system with emphasis on Mars; and life support systems for human solar system exploration missions.

Space Science Division personnel participate in a variety of major NASA missions. Division scientists are/were Investigators, Team Members, or Interdisciplinary Scientists on Pioneer, Voyager, Galileo, the Ulysses space physics mission, the Japanese cooled space infrared telescope (IRTS), the Cassini mission to Saturn, and the Kuiper Airborne Observatory. Division scientists are involved in the development of the Stratospheric Observatory for Infrared Astronomy (SOFIA), planetary detection with Kepler, Stardust, the Mars Surveyor program, the Space Infrared Telescope Facility (SIRTF), and Next Generation Space Telescope (NGST).

The programs in the Space Science Division are international in scope, ranging from active participation in international scientific meetings and societies, to collaborative ground-based research projects, to scientific investigations on international flight missions and projects.

Extensive ties are maintained with the academic community through collaborative research programs and development of

science curricula materials, and additionally, students at all levels represent a significant component of the Division's on-site research work force.

The Space Science Division represents a unique resource for NASA's Astrobiology Initiative and in support of the Agency's current and future manned and unmanned missions. The science and mission capability of the Space Science Division described here is unmatched by any other NASA Center or national laboratory.

The Division is organizationally divided into four Branches (see Figure 1) named according to the focus areas of the research conducted by the scientists in those Branches: Astrophysics, Astrobiology Technology, Exobiology, and Planetary Systems.

In 1998, the Division employed 70 Civil Service personnel, 45 of whom are Ph.D. scientists. This core permanent staff is augmented with approximately 150 scientists and technicians who are non-civil servants resident in Division facilities through mechanisms such as grants, cooperative agreements, support contracts, fellowships, visiting scientist positions, and student internships.

It is common for visiting scientists from U.S. universities to spend their summer research or sabbatical time in the Division's laboratories and facilities. Extensive ties are maintained with the academic community through collaborative research programs and also through the development of science curricula materials. The Space Science Division is dedicated to fostering greater interest in careers in the sciences and provides unique opportunities for training the next generation of scientists. Students at all levels – high school, undergraduate, graduate, and post-doctoral – represent a significant component of the Division's on-site research work force. In 1998, 21 National Research Council Postdoctoral Fellows were resident in the Division, 8 undergraduate students were employed through various internship programs, and Division personnel managed the Astrobiology Academy, a competitive program for college undergraduates to participate in hands-on research projects here at Ames Research Center.

In the following section of the Annual Report, the research programs of each Branch are summarized. Within each area, several examples of research topics have been selected for more detailed description. Following that section is a list of publications authored by Division personnel with 1998 publication dates. Finally, if a particular project is of interest, the personnel roster that begins on page 81 may be used to contact individual scientists. ❑

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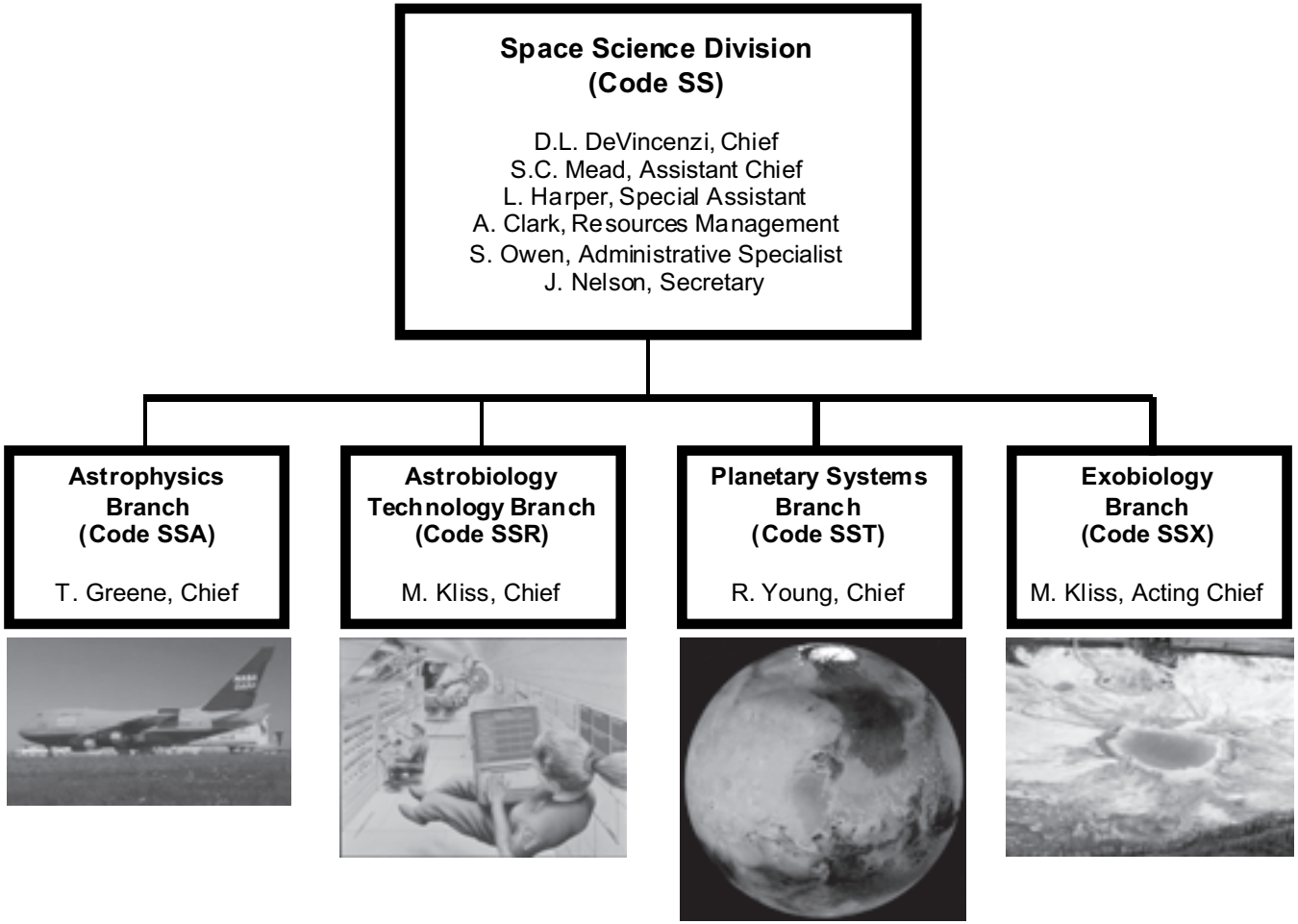

Figure 1. Space Science Division organization chart.